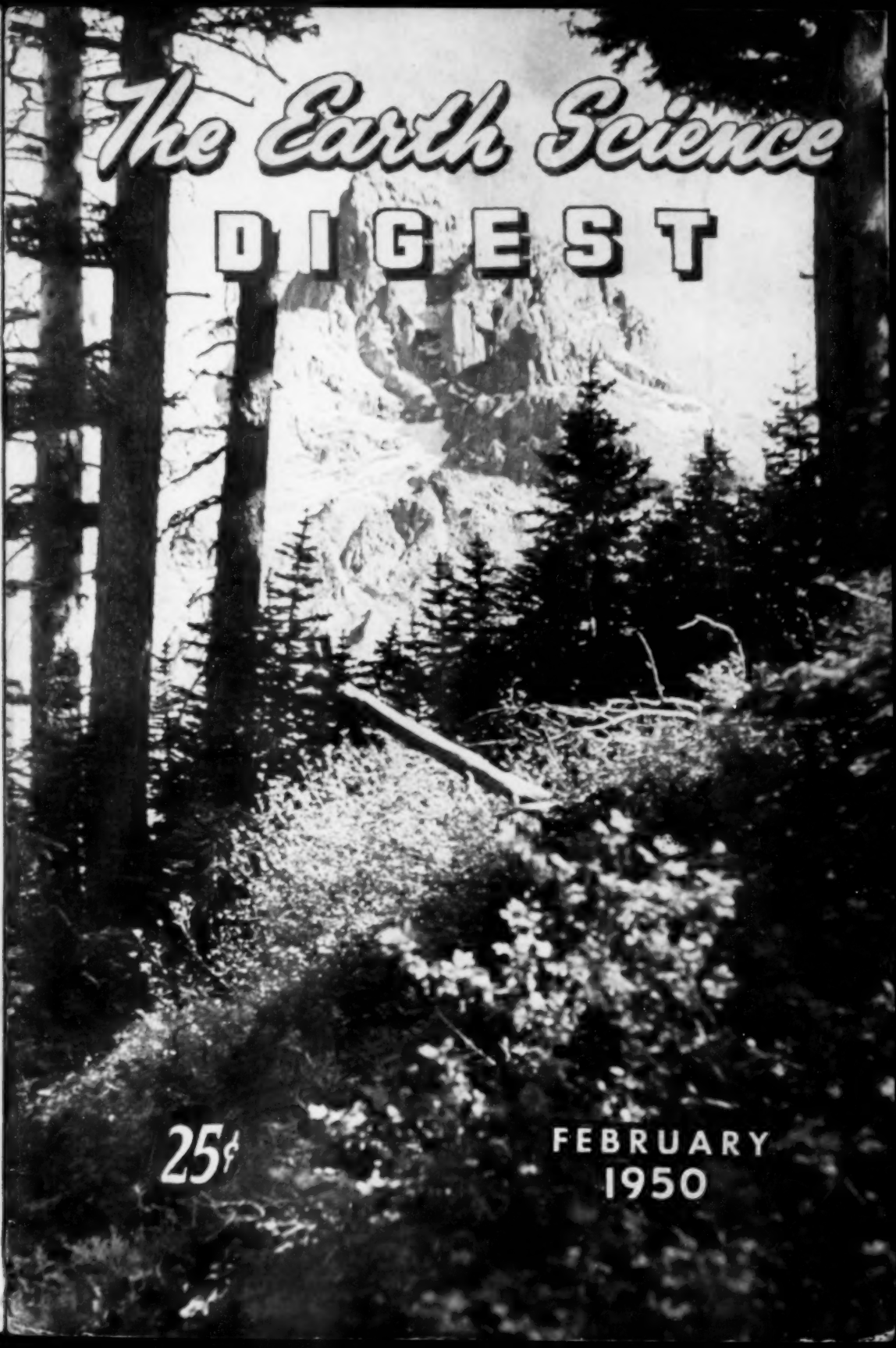
The Earth Science
DIGEST
25¢
FEBRUARY
1950

The Earth Science Digest

Revere, Massachusetts

Vol. IV February, 1950 No. 7

A magazine devoted to the geological sciences.

THE EARTH SCIENCE DIGEST is open to articles of geologic interest. Manuscripts, photographs and sketches will be returned if accompanied by ample first-class postage.

Subscriptions: U. S. and possessions, Canada, Philippine Is., Latin America and Spain: 1 year, $2.00; 2 years, $3.75; 3 years, $5.00. Other countries: 1 year, $2.50. Single copies, 25 cents.

Special group subscription rates allowed to educational institutions and societies.

Published monthly by The Earth Science Publishing Company, 77 Victoria St., Revere, Mass. Entered as second class matter April 12, 1948 at the post office at Boston, Massachusetts, under the Act of March 3, 1879.

S. ALBERT EISENBERG, Publisher
GERTRUDE ROBERTS, Business Manager

CONTENTS

Meetings and Conventions 1
Dr. Larsen Appointed Asst. Chief Geologist of the U. S. G. S. 2
Dr. Leighton Edits State Geologists' Journal 2
Water Resources — January 1950 2
ARCHEOLOGY AND GEOLOGY IN NORTHWESTERN ALASKA—Ralph S. Solecki 3
AIRBORNE SEARCH FOR URANIUM ANNOUNCED 8
Neanderthal-Type Jaw Found at Montmaurin, France — H. Field 10
Cover Photo 10
EARTH SCIENCE ABSTRACTS:
Physical Geology 11
Petrology 11
Paleontology 12
Radioactivity 12
Severe Earthquake in China 13
Letters to the Editor 14
RESEARCH ON SYNTHETIC MICA 15
NEW YORK STREAMS ARE NOT DRYING UP 16
NEW BOOKS 18
THE EARTH SCIENCE INSTITUTE BULLETIN — Vol. 2, No. 1 21

Meetings and Conventions

Earth Science Institute, Annual Meeting. March 17, 1950. Boston University, Boston.

Conference on the Teaching of the Earth Sciences in the Secondary Schools. March 17-18, 1950. Boston University, Boston.

National Speleological Society, National Convention. March 31 - April 2, 1950. Dodge Hotel, Washington, D. C.

Seismological Society of America, Annual Meeting; Cordilleran Section of the Geological Society of America, Annual Meeting. April 7-8, 1950. University of Washington, Seattle, Washington.

American Association of Petroleum Geologists, 34th Annual Meeting; Society of Economic Paleontologists and Mineralogists, 23rd Annual Meeting; Society of Exploration Geophysicists,

19th Annual Meeting. April 23-28, 1950. Chicago.

American Geophysical Union, Annual Meeting. May 1-4, 1950. Washington, D. C.

California Federation of Mineralogical Societies, 11th Annual Convention. June 17-18, 1950. Trona, California.

American Federation of Mineralogical Societies, 3rd Annual National Convention; Midwest Federation of Geological Societies, 19th Annual Convention, June 28-30, 1950. Milwaukee Auditorium, Milwaukee, Wisconsin.

Dr. Esper S. Larsen 3rd Appointed Asst. Chief Geologist of the U. S. G. S.

WASHINGTON, Jan. 19 — Dr. Harry S. Ladd, who has served in an administrative capacity in the Geologic Division of the U. S. Geological Survey, first as Regional Geologist at Rolla, Mo. then as Chief of the Division of Areal Geology and Basic Sciences, and finally as Assistant Chief Geologist, has been granted a request for relief from such duties and assigned to resume research work in the paleontology and ecology of mollusks.

In addition, Dr. W. E. Wrather, Director of the Survey, has designated Dr. Esper S. Larsen, 3rd, to succeed Dr. Ladd as Assistant Chief Geologist. Dr. Larsen was trained as a geologist and petrographer at Harvard and spent the early years of his career on petrographic research in a private laboratory. He joined the Geological Survey in November 1942, and served in the Military Geology Unit, being its Chief for one year from August 1945 to August 1946. Since the war he has been engaged in petrologic research.

Dr. Leighton Edits State Geologists' Journal

Dr. Morris M. Leighton, Chief of the Illinois State Geological Survey, Urbana, is editor of the State Geologists' Journal, a newly created official publication of the Association of American State Geologists. This semi-annual journal, the first number of which has just appeared, is devoted to information on the organization, facilities, activities, accomplishments, and publications of the various geological surveys of the United States who are pursuing research in the natural resources field. The present issue deals with state survey appropriations, mining development and economics, educational extension and public service, news notes, recent technical books, and a directory of state geological surveys.

Water Resources

JANUARY, 1950

Reservoirs in the New York City system have benefited from the above-normal runoff that was quite general throughout the Northast.

Stream flow was below normal along the coast from Massachusetts to Alabama with deficient runoff in several small areas.

High water and floods prevailed from the Great Lakes area to the Gulf of Mexico. New maximum flood discharges were recorded in Indiana, Illinois, Mississippi, and Alabama. Most of the larger rivers, including Ohio and Mississippi Rivers, were high but did not approach maximum stages.

In the West stream flow and snow cover were reported near normal or above, except in Canada, southern California, and Arizona where stream flow was deficient.

— Water Resources Review

ARCHEOLOGY AND GEOLOGY IN NORTHWESTERN ALASKA

RALPH S. SOLECKI
Smithsonian Institution, Washington, D. C.

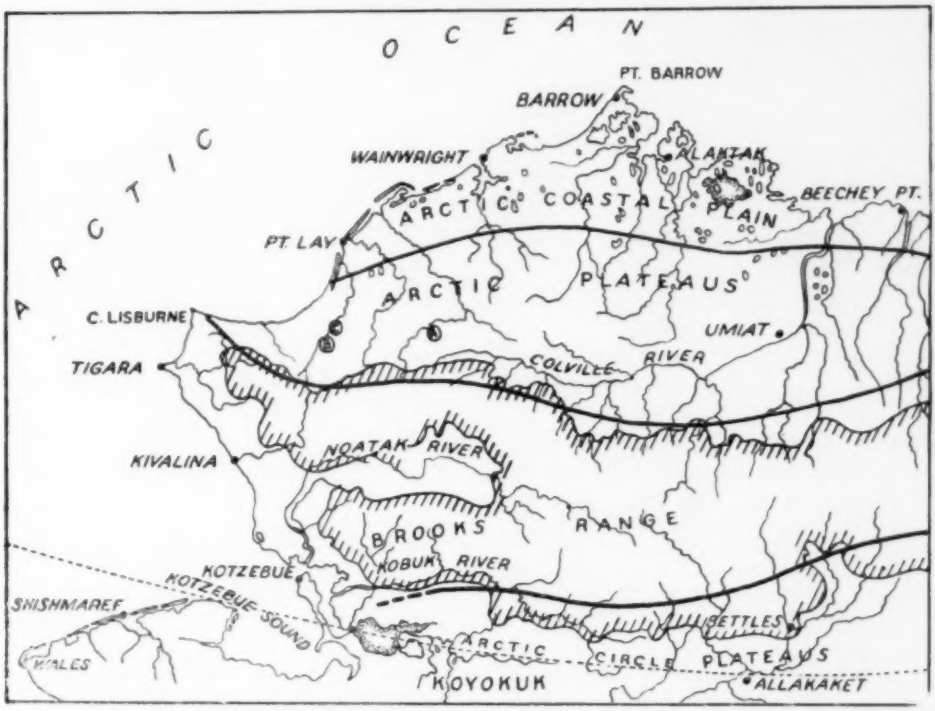

Fig. 1—Three geographic provinces in northwest Alaska. The shaded area represents the farthest extensions of glaciation in the Brooks Range Province.

New archeological evidence found on the north slope of Alaska lends additional supportive data to the theories of migration of prehistoric man from Asia to America.

The U. S. Geological Survey had plans for making a study of an area on the Kukpowruk and Kokolik Rivers in northwestern Alaska during the 1949 season. It was suggested that since a Folsom point was found by the Geological Survey (Thompson, 1948) in the hitherto archeologically unknown inland area nearby (Fig. 1, A) more Early Man material might be recovered there. In view of the probabilities of securing more information, an archeologist (the

Fig. 2—Asia-America links, represented by diagnostic artifacts. (A) Lamellar flakes; (B) Polyhedral core; (C) Semi-polyhedral cores; (D) End scrapers; (E) Knife or scraper.

writer) was sent from the Smithsonian Institution to accompany the Geological Survey party which was to examine the two rivers mentioned. These rivers are situated beyond the Arctic Circle and north of the Brooks Range — the northernmost mountain range in North America. Necessary arrangements were made by the Bureau of American Ethnology, Smithsonian Institution, the U. S. Geological Survey, and the Office of Naval Research for the addition of an archeologist to the complement of the field survey party.

The results of the archeological reconnaissance were gratifying, particularly since new information was obtained relative to the inland archeology of northern Alaska.

A general assay of the finds, including some 192 archeological sites, has been submitted in a preliminary report to the Smithsonian Institution (Soleki, n. d.). At the outset it might be noted that no additional Folsom remains were discovered.

The material complex of a singular flint-working industry linking Asia with America was one of the notable contributions. Representing this industry — evidence of a hunting occupation — are the so-called semipolyhedral and polyhedral cores, and their derivatives, lamellar flakes (Fig. 2). These artifacts were found on two sites

Fig. 3—Man standing on an archeological site overlooking the Foothills (Plateaus) Province. The Kukpowruk River is shown to the left of center.

(Fig. 1, B, C). For practical considerations, these flakes and cores are similar to those found on the University of Alaska Campus at Fairbanks, Alaska over 15 years ago (Nelson, 1937). Nelson (ibid.) asserted that he has found similar artifacts in the Gobi desert. On the strength of this it would seem to imply a connection of some sort. The problem of exactly where to place the nomadic hunting occupation chronologically is at present unsolved, although Nelson hints that the culture is reminiscent of the Mesolithic period in the Old World.

The geological equation is reviewed here for a possible clue to the solution of the problem.

Briefly described, the northern part of Alaska is divided into three geographic provinces—the Brooks Range Province, the Arctic Plateau or Foothills Province, and the Arctic Coastal Plain Province (Smith and Mertie, pp. 32-51, 1930). The Brooks Range, made up mainly of resistant Paleozoic rock, is actually a series of ranges extending across the northern part of Alaska, with an elevation up to about 8,000 feet. In Pleistocene times this range was glaciated from end to end of its 600 miles. Today there are only three or four glaciers remaining which are only 2 and 3 miles long.* The Foothills Province abutting on the north side of the mountains slopes down to the north from an elevation of about 3,000 feet to about 350 feet, more or less. This region, which was unglaciated, is characterized

*The U. S. Geological Survey reports that recent air photos of the Brooks Range Province show between 30 to 40 small glaciers, located along the crest of the range.

Fig. 4—A frost-wedge, one of the Ice Age relics on the bank of the Colville River, near Umiat, Alaska.

by folds of mainly Mesozoic rocks with anticlinal and synclinal axes having an east-west alignment. The next province is as forbidding to overland passage by virtue of its flatness as the mountains are impassable due to their ruggedness. The Coastal Plain is characterized by a bare expanse of flat tundra plain relieved by a few low hills. There are meandering streams, countless stagnant pools and lakes in unending procession. This province, which had been part of a sea-floor in late geologic time, was never glaciated.

There is good reason to believe that Early Man could have crossed the top of the world over the unglaciated "North Slope" to the heart of North America, bypassing the great ice fields extant in the late Wisconsin stage of the Pleistocene epoch. The MacKenzie River route, which was free from glaciation about 25,000 to 30,000 years ago, would have had its logical port of entry at the mouth on the Arctic. The alternate route over the divide from the Yukon drainage to the McKenzie would not have been open until considerably later, perhaps 10,000 to 15,000 years ago (Johnston, 1933, pp. 44-45).

By far, the majority of the archeological sites were merely hunting stations or observation points on hilltops and knolls near the rivers and reasonably close to game trails. At those sites, the evidence suggests that the hunter lay in wait for caribou, once very numerous. Archeologically, the foothills section, made up of Cretaceous sandstones and shales, is the best area for research. It may have been the best hunting area also. It would seem that chances of getting game there would be

easier as there was plenty of cover. Sites may be readily found on the lower hills and knolls, especially in barren or denuded areas, a not infrequent phenomenon.

No stratified sites were located. The artifacts seem to have been dropped where they were, as found, sometimes even on bare rock. The puzzling factor, in trying to estimate a date of any geological worth through soil accumulations, is that there is little if any soil present on the hills. There is scant chance of soil accumulation through organic or other means. Vegetation is very sparse on the hills, and the whole north slope is treeless since it is beyond the tree zone. The annual precipitation for this arid country is only 5 to 7 inches. Erosion is not as great on the barren hillsides as it would be were this area less frigid climatically. The ground is frozen at the surface most of the year with the exception of a few short summer months. This might explain why there is little displacement of the artifacts which occurred from surface levels to about 6 inches in depth. In lieu of normal soil erosion as we know it, sometimes there is a localized mud flow or "solifluction" on the hill slopes. The subsurface depths are frozen quite solidly with what is called "permafrost," actually frozen solid extending down to as much as 1,000 feet in some places. Permafrost dates back to about Pleistocene times in the north.

It would seem that the flints, mentioned above, were dropped on the barren hills during conditions of climate and environment similar to those of today.

The majority of the artifacts are made from local chert nodules which range in color gradations from a gray-green through red to black. Gray-green chert is most abundant. Such chert nodules occur naturally on river beds or in native chert outcrops. In addition to utilizing the local chert source, there is evidence that the makers of the polyhedral cores and lamellar flakes used material such as chalcedony which was not native to the area.

No assignable date may yet be given to the Asiatic-American links, namely the cores and lamellar flakes. However, there is accumulating a mass of data indicating that they represent a culture phase which seems to be definitely pre-Eskimo and pre-Athabascan in this region, certainly over 2,000 years old and probably closer to 5,000 years. The conditions under which the materials were found would not seem to make them very much older than that, although there is considerable room for speculation.

REFERENCES

JOHNSTON, W. A. 1933. Quaternary Geology of North America in Relation to the Migration of Man. **In** The American Aborigines, their Origin and Antiquity. Diamond Jenness, ed., Toronto.

NELSON, N. C. 1937. Notes on Cultural Relations between Asia and America. **In** American Antiquity, Vol. II, No. 4, pp. 267-272, April. Menasha, Wisconsin.

SOLECKI, RALPH. n. d. A Preliminary Report of an Archeological Reconnaissance of the Kukpowruk and Kokolik Rivers in Northwest Alaska. Manuscript.

SMITH, PHILIP S. and MERTIE, J. B., JR. 1930. Geology and Mineral Resources of Northwestern Alaska. Bulletin 815, U. S. Geological Survey, Washington.

THOMPSON, RAYMOND M. 1948. Notes on the Archeology of the Utukok River, Northwestern Alaska. **In** American Antiquity, Vol. XIV, No. 1, pp. 62-65, July. Menasha, Wisconsin.

Airborne Search For Uranium Announced

WASHINGTON, Feb. 26 — With more uranium than ever needed for the construction of new types of bombs, the U. S. Geological Survey has developed novel prospecting methods, using airplanes and light trucks for speeding location work, Secretary of the Interior Oscar L. Chapman said today. The work is being performed as part of a cooperative program with the Atomic Energy Commission.

"Interior Department scientists in the Geological Survey have been experimenting successfully for some months with the location of radioactive ores containing uranium and thorium, using delicate equipment shock-mounted in light trucks," Secretary Chapman pointed out. "They have also been doing subsurface prospecting with Geiger-counter probes lowered into shallow holes dug in the soil with earth-augers, or into holes drilled into solid rock as far down as 300 feet."

The technique of airborne prospecting for uranium, now in the experimental stage, has in large part incorporated prior development by the Geological Survey of aeromagnetic surveying. The airborne magnetometer, the so-called "bird", is attached to a cable under the belly of the plane.

In making a technical report before a scientific society recently, Frank W. Stead, chief of the technical planning and development unit of the Survey's Geologic Division told electrical engineers that even when the search for new deposits of minerals and metals is narrowed to those that are radioactive, the varieties of equipment useful for prospecting are still numerous. That which the Survey has been using is based almost exclusively on the Geiger counter as a radiation detector.

Such equiupment falls into three distinct groups, dependent on whether it is used for surface, subsurface or airborne reconnaissance. Up to the present time, surface prospecting for radioactive ores has been carried out largely on foot, using small portable meters of the type needed in radiological safety practice. These meters are usually modified by substituting special probes containing four to six Geiger counters of the sort commonly used in cosmic ray research.

A typical survey meter of this type has four 18-inch brass wall Geiger counters in a water proof probe housing. Both probe and amplifier are mounted on a packboard; the recording meter and a range switch being carried in a small case strapped to the chest. The total weight is about 20 lbs.

With modifications this same equipment can be used for prospecting in shallow holes made with soil augers.

But to increase the speed of prospecting, similar instruments have been installed in automobiles. One arrangement calls for two 42-inch Geiger tubes mounted on the roof of a car. The counting rate meter, modified for rapid response, incorporates an alarm circuit set to signal when the number of radiations detected reach a predetermined rate. This is shock mounted in the instrument panel. Such equipment permits rountine prospecting along roads at an average speed of 30 miles an hour. Total weight is about 25 pounds.

Subsurface prospecting is more or less restricted to gamma-ray logging of exploratory drill holes.

These can be as small as 1¼ inches in diameter; the probe housing the Geiger counter being one inch in diameter. The Survey has been using this type of prospecting tool in the Colorado Plateau since 1948. The basic elements of the equipment have been published by the Atomic Energy Commission as Report AECD-1997, Barnaby. Two men are needed to operate such units.

For airborne prospecting now in the developmental stage, Secretary Chapman disclosed that present techniques in large part incorporate prior development by the Geological Survey of methods for determining the position of an observation, and of recording the data obtained by aeromagnetic surveying.

In addition refinements commonly used in measuring cosmic radiation have been adopted to airborne search for radioactive materials. For example, "background noise" due to cosmic radiation had to be cut down. This is accomplished by a thick one-inch lead shield above the Geiger counters to reduce the soft component of cosmic radiation, while a special arrangement of counter tubes in hexagonal bundles directly below the lead shield, allows the hard component to be reduced. In this way, with the background noise of cosmic radiation much diminished, gamma radiation from ground sources can be measured more accurately.

It is impossible at the moment to state the sensitivity of this particular equipment. But using a radium source and by extrapolation, the standard deviation at normal levels of measurement is 0.3 micro-roentgens per hour.

Since radioactive radon gas is known to escape from radioactive ores, an arrangement is also made to monitor the atmosphere thru which the Geological Survey's newly equipped prospecting plane will fly. Air flow from an intake in the nose of the plane is led back to an air conductivity meter. This is a cylindrical condenser with the inner coaxial member connected to a vibrating reed electrometer. An amplifier and Brown recorder for the meter are mounted on a table behind the intake duct. In this way it is hoped the ionization of the atmosphere due to radon escaping from radioactive ores can be measured.

As might be expected, such elaborate and complicated equipment installed in a plan involves considerable weight. Roughly this is about 1,400 pounds, exclusive of the power source. Obviously, this equipment and that used in subsurface explorations are beyond the reach of the average prospector and are intended for use by large organizations.

It is emphasized that although the Geiger counter is not essential for surface prospecting, it is nevertheless a highly useful tool. An experienced prospector can recognize minerals of other metals. But a counter is a great aid because it can detect the presence of uranium when it cannot be immediately identified by visual inspection. The lighter and cheaper models providing earphones are entirely satisfactory for the average prospector.

The more complex, expensive models, providing meters, range switches, and other refinements are best used by geologists and engineers in evaluating ore deposits. The commercial portable beta-gamma survey meters are not designed for field use and have the usual shortcomings of devices built for indoor purposes.

The methods and equipment used in the experimental work of the Geological Survey are intended to supplement, rather than take the place of, prospecting by private

individuals. For such prospecting the small handbook prepared by Survey officials in cooperation with the Atomic Energy Commission, "Prospecting for Uranium" is still the best available guide. It can be purchased at 30 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Neanderthal-Type Jaw Found At Montmaurin, France

HENRY FIELD (Science Service)

One of man's oldest ancestors was a man without a chin. Report of the discovery of his bones has just been received from France.

In a cave called Coupe-Gorge, opened accidentally by quarry workers at Montmaurin, Haute-Garonne, one of the excavators found some interesting bones and called in L. Meroc of the Toulouse Museum. Under his direction the workman dug up a lower jaw of Neanderthal type which had been buried there about 50,000 years.

This jaw is complete, but only three molars remain on each side, the other teeth having long since disappeared.

The teeth show that the gentleman of Mountmaurin was a youth about 20 years old. The most striking feature is the entire absence of a chin. In this respect the mandible resembles the Mauer jaw, knowns as Heidelberg man (Homo heidelbergensis) and attributed to a period about 250,000 years ago. However, since Neanderthal Man roamed Western Europe from 75,000 to 40,000 B. C., the man who left his jaw in the Mauer sands may have been a direct ancestor of the Montmaurin man.

In a personal communication Mr. Meroc writes that Prof. H. V. Vallois, of the Institut de Paleontologie Humaine in Paris, examined the new jaw and agrees that it is one of the most primitive types known.

The Abbe Henry Breuil examined the site recently and estimates that the Coupe-Gorge mandible is as old as the stone implements found in the lowest Mousterian levels, attributed to the last interglacial period.

The Mousterian tools are so called because they were found at Le Moustier, Dordogne, France. They are really the handiwork of Neanderthal Man who was given his name because his bones were originally discovered in 1857 in the Neander Valley near the Rhine.

The discovery of the Coupe-Gorge jaw adds an important link in the chain of evidence for the range of Neanderthal Man. It is now known that he lived in regions all the way from the rock of Gibraltar on the west to Tashkent in Soviet Central Asia on the east. His Mousterian cultures have been found far more extensively across Europe into Siberia, in Asia, and in Africa.

Cover Photo

This month's cover photo is a view of the Grand Teton, 13,766 feet in height, a majestic member of the lofty Teton Range in Wyoming. This view is to the east, taken from the Solitude Lake Trail. A close-up of this view as seen from Jackson Hole, Wyoming, appeared on the April 1948 cover of the Earth Science Digest. Photo by H. P. Zuidema, University of Michigan.

Earth Science Abstracts

[Selected articles on the earth sciences, appearing in current scientific publications, are abstracted here for the convenience of our readers.]

PHYSICAL GEOLOGY

GEOLOGY OF ATLANTIC COASTAL PLAIN IN NEW JERSEY, DELAWARE, MARYLAND & VIRGINIA. Walter B. Spangler and Jahn J. Peterson. **Am. Assoc. Petroleum Geologists Bull.,** Vol. 34, No. 1 (Jan. 1950), pp. 1-99. In this detailed study of the Cretaceous and Tertiary stratigraphy, detailed lithologic descriptions, based on field examinations, are presented, along with diagrammatic cross-sections, profiles showing the contrast in relationships of beds based on past and present assignments and interpretations, and isopach and structure maps for the major formational divisions.

❖

SEISMIC EVIDENCE FOR THE FAULT ORIGIN OF OCEANIC DEEPS. Hugo Benioff. **Geol. Soc. America Bull.,** Vol. 60, No. 12, Part 1, pp. 1836-1856. The actual fault movement during the interval covered by a given sequence of earthquakes may be determined by a method described for determining the elastic-rebound strain increments associated with earthquakes on a particular fault. This method also shows whether a chosen sequence of earthquakes represents the movements of a single fault structure. Evidence is offered that the Tonga-Kermadec (Australian area) and South American earthquake sequences originate on great faults which extend beneath the continental masses to a depth of about 650 km. each. The associated oceanic deeps are surface expressions of the downwarping of their oceanic blocks. Upwarping of their continental blocks produced islands in the Tonga-Kermadec region and the Andes Mountains.

❖

TERRAIN DIAGRAMS OF THE PHILIPPINE ISLANDS. Philip B. King and Edith M. McKee. **Geol. Soc. America Bull.,** Vol. 60, No. 12, Part 1, pp. 1829-1836. Four terrain diagrams, on a scale of 1:1,000,000, cover all the Philippine Islands. Mountain areas are pre-Tertiary basement rocks (geanticlines or horsts), and Tertiary and Quaternary volcanics; while Tertiary and Quaternary sediments (downwarps) form the lowland areas. The Philippine fault zone, a striking tectonic feature, is a belt of dislocation which extends southeast from Luzon to Mindanao.

PETROLOGY

THE INTRUSIVE MECHANICS OF A CLASTIC DIKE. Matt S. Walton, Jr. and Robert B. O'Sullivan. **Am. Jour. Sci.,** Vol. 248, No. 1 (Jan. 1950), pp. 1-21. Detailed field and petrologic study of a clastic dike of Triassic conglomerate penetrating a dolerite sill from its underlying source bed near New Haven, Connecticut leads to a novel, challenging concept of its mode of injection. The intrusive mechanism involves expansion of water vapor in the pores spaces of the conglomerate in response to the heat of intrusion and a local drop in pressure resulting from the opening of a fracture in the cooling dolerite. Possible application of this mechanism to explain controversial injection phenomena in certain basic igneous rocks is suggested. (K.E.L.).

STRUCTURE OF THE EARTH'S CRUST IN THE CONTINENTS. B. Gutenberg. **Science,** Vol. 111, No. 2872 (Jan. 13, 1950), pp. 29-30. A succession of relatively thin layers of different material in the earth's crust, or the effect of physical processes, explains the phenomenon of the low velocity layer, which occurs below layers of higher velocity in the earth's crust. The transition from crystalline to amorphous material near or at the melting point is thought to result in the decrease in wave velocity at a depth of about eighty km. The Mohoviric discontinuity (between thirty to forty km. in depth) is thought to mark the transition from simatic rock above to ultrabasic rock below.

❖

DIFFUSION OF IONS THROUGH INTERGRANULAR SPACES IN WATER-SATURATED ROCKS. R. M. Garrels, R. M. Dreyer, and A. L. Howland. **Geol. Soc. America Bull.,** Vol. 60, No. 12, Part I, pp. 1809-1828. The results of experimental work on diffusion through rock pores are in accord with the general diffusion theory. The rate of advance of a concentration front was independent of porosity or permeability in the limestone studied. Methods of measuring the porosity are discussed, and values are determined for several limestones.

PALEONTOLOGY

FOSSIL BURROWS FROM THE PRECAMBRIAN AJIBIK QUARTZITE OF MICHIGAN. Henry Faul. **Jour. Paleontology,** Vol. 24, No. 1 (Jan. 1950), pp. 102-106. Small sinuous marking on the bedding surfaces of quartzite near Ishpeming, Michigan, are believed to be burrows made by an unknown organism. An absolute age greater than 1200 million years is indicated by helium age measurements.

RADIOACTIVITY

RADIUM CONTENT OF ULTRAMAFIC IGNEOUS ROCK: III: Meteorites. Gordon L. Davis. **Am. Jour. Sci.,** Vol. 248, No. 2 (Feb. 1950), pp. 107-111. The radium content of meteorites is generally lower than that of terrestrial ultramafic (silica-deficient) rocks and minerals.

❖

THE AGE OF URANINITE FROM GORDONIA, SOUTH AFRICA. Arthur Holmes. **Am. Jour. Sci.,** Vol. 248, No. 2 (Feb. 1950), pp. 81-94. A probable age of 1025 ± 10 million years has been determined for uraninite from Pre-Cambrian pegmatites north of the Orange River by an isotopic analysis of the lead separated from the mineral. The effects of loss of uranium and lead on the apparent ages of minerals is illustrated.

[The following abstracts are reprinted in part from **Nuclear Science Abstracts,** Vol. 3, No. 11 — Vol. 4. No. 2 (Dec. 15, 1949 - Jan. 30, 1950), by permission of the U. S. Atomic Energy Commission.]

CONFERENCE ON RADIOACTIVE ORES. A. K. Snelgrove, ed. Michigan College of Mining and Technology. May 6, 1949. 33 pp. At this conference the following papers were presented: Domestic uranium program of the United States Atomic Energy Commission, by Muriel Mathez; Pitchblende — the primary source of uranium, by Phillip L. Merritt; The geologic environment of primary vein deposits of uranium, by Donald L. Everhart; Uranium deposits of the Canadian shield with emphasis on the Theano Point, Ontario, discoveries, by A. H. Lang; Geiger counter reconnaissance in upper Michigan, 1948, by C. Ernest Kemp; Prospecting for uranium with portable Geiger-Mueller equipment, by F. W. Stead; Prospecting on state land in Michigan, by F. G. Pardee.

❖

EVALUATION OF THE URANIUM CONTENT OF MINERALS BY THE MEASUREMENT OF THE NUCLEAR RADIATIONS. J. Thommeret. **Jour. Phys. Radium,** Vol. 10 (July-Sept. 1949), pp. 249-252 (in French). A brief report is given of a direct method of estimating the uranium content of minerals free of thorium by means of two activity measurement made with

two Geiger-Mueller counters. The method is applicable to all the minerals which are in the natural state or have undergone mechanical treatment such as washing or flotation. Tabulated data which were obtained by this method are given for a number of minerals; these are compared with the results of chemical determinations of the uranium content and the absolute and relative errors are tabulated.

❖

ON AN NEW KIND OF RADIOACTIVE INCLUSIONS IN IGNEOUS ROCKS. Renè Coppens. **Compt. Rend.,** Vol. 228, pp. 1938-40 (June 20, 1949) (in French). In previous notes two sorts of radioactive inclusions in igneous rocks, as recorded on photographic plates, were described: (1) very small (several microns) and strongly radioactive inclusions containing U and Th, (2) crystals of undetermined species, about 1 mm. large, containing 1% Th, and no U. The present note is a report on a third kind of inclusions, observed in a sand from Brittany and in a granite: having an area of several hundredths of square mm., they are strongly radioactive; they contain Th, but little or no U; the Th content, which is about 76%, corresponds to pure thorite, $ThO_2.SiO_2$.

❖

THE ISOTOPIC COMPOSITION OF FOSSIL ICE. R. V. Teis. **Doklady Akad. Nauk. S.S.S. R.,** Vol. 62 (1948), pp. 365-367 (in Russian). Vernadskii (Compt. Rend. 199, 694 (1934), has pointed out that in the process of melting of the great masses of ice of the glacial age, a gradual enrichment in the deuterium content should take place, due to the difference in vapor densities of H_2O and D_2O (heavy water); an investigation of fossil ices should give information on the phenomenon. The present author studied several samples of Siberian fossil ice from various localities, by using his method of combined determination of density and refraction index. The measurement confirmed the positive deuterium effect.

NEW DATA ON THE GEOCHEMISTRY OF INERT OR NOBLE GASES, V. G. Khlopin and E. K. Gerling, Radium Institute, Academy of Science, USSR. May 20, 1948. 6 pp. A new method and formula for determining the age of uranium minerals by the ratio of xenon to uranium in them has been proposed and verified experimentally. The same formula can be used to estimate how much xenon can accumulate in the earth's crust during the geological time of its existence. The origin and occurrence of other noble gases (krypton, argon, helium) is discussed with particular emphasis on the radioactive and astrophysical origin of subterranean helium.

Severe Earthquake In China

WASHINGTON, Feb. 6 (Science Service)—Loss of life and property damage was probably caused in Yunnan province, in the southwestern tip of China between Burma and French Indo-China, by a world-shaking earthquake Thursday, Feb. 2 (4:33 A.M. EST.). Located by instrumental reports from seismographs in Japan, India, Java, and this country, the quake is centered in communist-held territory where communications even normally are slow. It will take time for any destruction to be reported.

The intensity of the quake was 6.7 on a scale on which 8.5 is tops in magnitude. The center is not far from where the Tropic of Cancer cuts across, the geographical coordinates being 23 degrees North and 101 degrees East.

Seismological records were collected by the U. S. Coast and Geodetic Survey with Science Service cooperating, and stations reporting were Tokio and five other Japanese localities, Bombay, Batavia, Pasadena, Calif., Fordham University in New York, Tucson, Ariz., Shasta, Calif., Boulder City, Nev., and Washington.

Letters To The Editor

Dear Sir:

In the September 1949 issue of your Digest there is an article by Dr. C. W. Wolfe that has aroused my special interest. Dr. Wolfe probably does not know that Dr. Nils Hj. Odhner in 1934 published the first account of his "Constriction Hypothesis", attributing orogens and other movements in the earth's crust to differences in temperature originating from the earth's interior. The forces of dilation and constriction have a tremendous strength, far superior to that of gravity, and to these forces all major movements of the earth's crust are ultimately referred by Odhner. I have given a short account of his theory in my inclosed paper*, but I am giving a more detailed explanation with drawings of this theory in a book to appear this spring.

Geologists have hitherto never proved a mountain chain to have sunk, only to have risen. From the enclosed paper you may find that I have already been able to give the first geological evidence of the now submarine Mid-Atlantic Ridge, i. e. the continent Atlantis, to have been above the surface of the sea during the Pleistocene, and the causes for its disappearance. In the coming book I can fix this catastrophe to have occurred many thousands of years after the end of the Wisconsin Glacial Stage and probably about 2,000 years B. C. The old sagas of Plato, e. g., have thus received a sound foundation, and the prehistoric immigration of man to America may be seen from a new angle. All the baffling discoveries of Ewing, Gutenberg, and Pettersson have been explained and also the connections between deep earthquakes, marine troughs, tertiary mountain chains, and volcanoes.

Almost all the major geological problems have been solved without employing such hypothetical agencies as convection currents, etc. With the seismological evidences of the earth's crust being solid, with an initial strength comparable to surface rocks down to 2,900 km., the theory of isostasy has to be rejected as impossible. With a choice between the blister theory of Dr. Wolfe and the more mature constriction theory of Odhner as the only alternatives, I am more than convinced the latter will prevail.

RENE MALAISE
Swedish Museum of
Natural History,
Stockholm 50, Sweden

[*ED. NOTE: An article by Dr. Malaise on Dr. Odhner's "Constriction Hypothesis" will appear in the March 1950 **Earth Science Digest.**]

* * *

Dear Mr. Eisenberg:

There is a slight possibility that you remember meeting me at the A. I. M. E. meeting in New York about two years ago. It was at that time that you explained the nature of your magazine to me, and outlined your plans for its future development.

I just want to say at this time that you have certainly made some wonderful strides forward in developing your magazine into something that is very useful and informative. I find it especially helpful in my classes for beginners in geology, and also in the class where I have students who are taking a survey course in geology. You certainly have my good wishes for an even more successful future . . .

REV. C. F. NIESET
Department of Geology
Saint Joseph's College
Collegeville, Indiana

RESEARCH ON SYNTHETIC MICA

Synthetic mica, with essentially the same properties as natural mica, but able to withstand much higher temperatures, has now been crystallized successfully by Dr. Herbert Insley, Alvin Van Valkenburg, and Robert Pike at the National Bureau of Standards. This work is part of a broad program of fundamental research on fluorine-type artificial minerals carried on by the National Bureau of Standards under the sponsorship of the Office of Naval Research. The synthetic mica phase of the program has been carried out in cooperation with the U. S. Bureau of Mines and the Colorado School of Mines.

In the Bureau's work on synthetic mica the requirements of eventual quantity production have always been kept in view. Mica could be synthesized by duplicating the conditions under which it is formed in nature, but this would involve extremely high pressures as well as high temperatures. For safety and convenience its is better to work at atmospheric pressure. For that reason the Bureau's scientists are using fluorine as a crystallizing agent to grow crystals of mica without using high pressure. Natural fluorine is a gas, poisonous and difficult to control. But a group of synthetic fluorine compounds, the fluorosilicates, provides a convenient way of introducing fluorine into mica synthesis.

The raw materials for making synthetic mica are similar to the raw materials sometimes used in making glass: quartz, magnesite, bauxite, and a fluorosilicate compound (the only unusual ingredient). The raw mixture is placed in a platinum-lined crucible and melted in an electric furnace at a temperature of nearly 1400 degrees Centigrade. As the furnace cools, mica crystals grow from a tiny seed at the bottom of the crucible.

The most satisfactory synthetic mica developed so far has the chemical formula $K_4Mg_{12}Al_2Si_{12}O_{36}F_4$. This is equivalent to a form of natural mica in which the hydroxyl radical has been replaced by fluorine. Impurities may occur in the synthetic mica in the form of milky films parallel to the individual layers or white patches between crystals. Crystals free of impurities are clear and transparent, and thin flakes are easily split away along the planes of natural cleavage. The synthetic form has physical properties which compare favorably with natural mica. The largest crystals grown so far at the National Bureau of Standards have a surface area of 4 square inches.

Satisfactory mica synthesis depends to a large extent on the materials used in the crucible lining. Ceramic linings are badly corroded by a fluorine-bearing melt. Carbon and silicon carbide crucibles are somewhat better, but fluoride gases escape through the relatively porous walls, and fine carbon particles become imbedded throughout the synthesized mica. Cricibles lined with platinum foil give the best results. They do not react with the melt and are able to withstand high temperatures for long periods. Although initial cost is high, the platinum linings may be melted down and re-formed again and again.

The shape of the crucible is also important in mica synthesis. Flat-bottomed crucibles are undesir-

able because they offer a large surface for the formation of many seed crystals which grow independently in different directions and thus limit the development of single large crystals. Mica has a sheetlike structure and grows faster in a direction parallel to its cleavage plane than in any other direction. Consequently, if a crucible with a cone-shaped bottom is used, the number of seed crystals is reduced and the direction of growth tends to be upward. Experiments are now in progress to find ways of predetermining crystal growth even more completely in order to grow large parallel sheets. The key to this seems to be precise control of temperature differences within the crucible.

Mica's remarkable properties as an electrical insulator have made it invaluable to electrical and electronics industries. The United States is the world's largest consumer of natural mica, but it produces only enough to meet a third of its requirements. During 1948 the United States imported over 10,000 tons of high-grade mica, mostly from India and Brazil, valued at more than 15 million dollars; in the same period, domestic high-grade production totalled only 135 tons with a value of less than 50,000 dollars.

Successful control of crystal orientation in the growth of synthetic mica would mean that machine methods could be used for large-scale domestic production of sheet mica. In this way mica synthesis could make the United States self-sufficient in high-grade mica insulating materials.

[Reprinted in part from U. S. National Bureau of Standards Technical Report 1410 — Synthetic Mica.]

NEW YORK STREAMS ARE NOT DRYING UP

New York City's present water shortage is likened to a man consistently but unconsciously overdrawing his bank account, according to the U. S. Geological Survey's monthly Water Resources Review for December. The latest Review states that only the good fortune of above-normal runoff into its reservoirs has prevented a shortage of water in New York City from developing earlier.

Survey hydrologists report that since May 1943, New York City has used water at a greater rate than the total dependable yield of its several sources of supply. Consumption in recent years has been averaging 1,200,000,000 gallons per day, as compared with a dependable yield of 1,045,000,000 gallons reported by the city of New York.

This year's drought has only been of moderate intensity, but it has led to nearly serious consequences for New York City because of preceding years of high runoff into its reservoirs and the associated avoidance of an accounting until now. Meanwhile water demands have continued to increase.

The Survey reports that runoff in the source areas of the New York City water supplies averaged about twice normal in the three month period of December 1948 to February 1949. As a result, storage

in reservoirs was well above normal at the end of February, and was approximately normal at the end of May.

Examining the situation further in retrospect, it develops that the total winter recharge to the reservoirs was about 90,000,000,000 gallons. But the draft on storage from June 1 to December 1, 1949 was 159,000,000,000 gallons or the equivalent of 870 million gallons per day, about three-fourths of the water used by the city.

Normally, only about one-third of the water used during this period is obtained by draft on storage, the remainder coming from the summer and fall stream flow and from wells in southern Nassau County.

The reason for this abnormal draft was the dry period that began in June 1949, and the high rate of use. Runoff into the reservoirs during the six month period from June to November averaged about 50 percent of normal, nearly setting a new low record. Lower flows for this period were recorded in 1909 and 1914.

However, total runoff for the past water years was not particularly low. Much lower flows were experienced without major difficulty as recently as 1941 and 1944, when the use of water was only about 80 percent of the current rate. If the rate of use that existed only as recently at 1944 had prevailed in 1949, the draft on storage probably would have been only about 100,000,000,000 gallons. This would leave sufficient reserves to avoid critical shortage despite the drought.

At present the reservoirs contain about 90,000,000,000 gallons or about 35 percent of capacity. At the present rate of use that is equal to about 70 days supply. The normal increment in storage during the winter-spring period of high runoffs is 60,000,000,000 gallons. Increments of twice this amount have occurred during past replenishment periods with abundant runoffs, as in 1947 when the reservoirs were filled to capacity.

However, owing to the depleted condition of the reservoirs this abnormal recharge would not raise the contents to their normal volume of 242,000,000,000 gallons next spring because the dry period has also resulted in the depletion of soil moisture and ground water. These have first call on any rain and snow melt, ahead of the New York reservoirs.

All of which makes the outlook for stream flow this winter lower than usual unless precipitation is far above the amount needed to satisfy the prior demands of nature. The prospects are that continued care in the use of water will be necessary in New York until new supplies now being developed in the Delaware Basin can be added to the City's dependable sources.

Heavy pumping of ground water in southern Nassau County to supplement the Croton and Catskill upstate supplies has lowered the water table in the pumped areas to record-low levels, and salt-water encroachment may result if pumping is continued.

Examining the evidence for the often repeated statements that our streams are drying up, the Survey hydrologists find this is not so. Such long-term stream-flow records as are available in the Catskill Mountain region show no persistent downward trend, except for a slight apparent decline in the flow of Schoharie Creek which is one of the water sources of New York City.

There have been large fluctuations in flow from year to year, characteristic of rivers everywhere,

but the flows during the past decade in general have not been greatly different from those during the first decade of the century when records of flow were started. The discharge of Schoharie Creek during the second half of the 42 year period in which records were kept, averaged 90 percent of that during the first 21 years. None of the streams are materially affected by regulation or diversion.

The situation in New York City and in metropolitan New Jersey is largely the consequence of an acceleration in the use of water that began during the war and has continued with undiminished rate since. Critical conditions are bound to threaten trouble wherever total use exceeds the dependable yield of available supplies.

At the present moment, critical conditions due to overdrafts are reported in a score of important areas throughout the country. These are mainly with respect to ground water, but some surface water overdrafts are reported also.

Survey engineers find that while generally the problems are engineering and economic rather than occasional by an actual deficiency of water, and while they are local in nature rather than widespread, the over-all situation must not be ignored. There is no cause for undue alarm but prompt steps must be taken to obtain a nation-wide appraisal of our water resources in order to meet expected future demands.

Not only is there need for more extensive coverage of the recharge and depletion rates of water sources in the nation's growing population centers, but a great many unknown factors effecting the total supply offer perplexing problems that can only be answered by long-term basic researches.

New Books

All books listed here are deposited in the Library of The Earth Science Institute and may be borrowed by the members. Books marked with an asterisk may be purchased through The Earth Science Publishing Co., Revere, Mass.

*STRUCTURAL PETROLOGY OF DEFORMED ROCKS.

Harold Williams Fairbairn. Second Edition. 1949. 344 pp., 213 figs., $12.50. (Addison-Wesley Press, Cambridge, Mass.). Two chapters on the statistical analysis of two-dimensional and three-dimensional fabric diagrams have been written for this second edition by Dr. Felix Chayes as an introduction to the student. A third chapter has been added on the problem of tectonic transport. Among other things added to this edition are a summary of rotation and relative movement of fabric elements, and an account of recent regional investigations. An excellent reference book, this work is too technical for the average student, presupposing a familiarity with structural petrology, petrography, optical crystallography, and morphology.

CAVERNS OF WEST VIRGINIA.

William E. Davies. 1949. 353 pp., 53 pls., 68 figs; $2.00. Vol. XIX. (West Virginia Geological Survey, Morgantown, W. Va.). This important addition to the speleologist's library contains a description of about 400 caves, with county maps showing the locations of the caves, and individual maps of the more important ones. The volume include discussions on the stratigraphy, areal distribution, patterns, features, mineralogy, origin, age, temperature and humidity, biology, and economic value of the caves.

GUIDEBOOK TO THE GEOLOGY OF UTAH — NUMBER 4:

The Transition Between the Colorado Plateaus and the Great Basin in Central Utah, by Edmund M. Spieker. 1949. 106 pp., 1 pl., 10 figs.; $3.00. (Geological Society of Utah. Utah Geological & Mineralogical Survey, University of Utah, Salt Lake City 1, Utah). The bedrock ranges in age from medial Jurassic to late Tertiary, represented by two different sections, the Colorado Plateau and the eastern Great Basin. The Wasatch Plateau graben, the Wasatch monocline, Sixmile district, Salina district, Sanpete Valley, and the Gunnison Plateau structures are described. A tabulation of the crustal movements in Central Utah is presented. Mileage logs of tours, written to accompany the text, cover three days of trips.

FORT ST. JAMES MAP-AREA, CASSIAR AND COAST DISTRICTS, BRITISH COLUMBIA.

J. E. Armstrong. 1949. 210 pp., 5 pls., 17 figs., 1 map; $0.75. (Memoir 252, Geological Survey of Canada, Ottawa). This report covers the physiography, general geology, structural and historical geology, economic geology, and a description of the mining properties of the area, including the placer gold deposits, and the famed Pinchi Lake mercury deposits, which occur along the Pinchi fault zone.

STRUCTURAL CONTROL OF THE GOLD DEPOSITS OF THE CRIPPLE CREEK DISTRICT, TELLER COUNTY, COLO.

A. H. Koschmann. 1949. 42 pp., 2 pls.; $1.25. (U. S. G. S. Bulletin 955-B, Supt. of Documents, Govt. Printing Office, Washington 25, D. C.). The gold deposits occur as veins within or at the margin of a mass of Miocene fragmental rocks, which occupy a basin in Pre-Cambrian igneous and metamorphic rocks forming the southeastern end of the Front Range of the Rocky Mountains. Probable favorable areas are pointed out for prospecting in unexplored parts.

GEOLOGY AND GROUND-WATER RESOURCES OF NORTON COUNTY AND NORTHWESTERN PHILLIPS COUNTY, KANSAS.

John C. Frye and A. R. Leonard. 1949. 144 pp., 10 pls., 11 figs; $0.25. (Bulletin 81, State Geological Survey of Kansas, Lawrence, Kansas). The topography is generally fine-textured and maturely dissected. The entire area is underlain by the Cretaceous Niobrara formation. The Cretaceous Pierre shale overlies it in northwestern Phillips County. The Pliocene Ogallala formation, the most widespread source of adequate well-water supplies, overlies the Cretaceous rocks and underlies nearly the entire area, except along the stream valleys. The Pleistocene Sanborn formation constitutes the near-surface deposit of most of the area and is an adequate source of potable ground water.

SOME MINERAL INVESTIGATIONS IN SOUTHEASTERN ALASKA.

W. S. Twenhofel, J. C. Reed, and G. O. Gates. 1949. 45 pp., 2 pls., 19 figs.; $0.40. (U.S.G S. Bulletin 963-A, Supt. of Documents, Govt. Printing Office, Washington 25, D. C.). Mineral investigations in southeastern Alaska from 1939 to 1944, including reports on gold, copper, magnetite, tremolite asbestos, gypsum, witherite, and barite, are described.

PETROGRAPHY OF THE ISLAND OF HAWAII.

G. A. Macdonald. 1949. 46 pp., 4 pls., 1 fig.; $0.35. (U.S.G.S. Prof. Paper 214-D, Supt. of Documents, Govt. Printing Office, Washington 25, D. C.). Olivine basalt constitutes the major part of the volcanoes, with smaller amounts of basalt and picrite-basalt. The olivine basalt is considered the parent magma, from which the andesites and trachyte are derived by crystal differentiation. Petrographic descriptions and chemical analyses of the rock types are included.

The BOOK SHELF

All books listed here may be obtained by sending a check or money order to THE BOOK SHELF, THE EARTH SCIENCE DIGEST, REVERE, MASS.

[We pay postage in the United States]

OUR TEN "BEST SELLERS"

Since we began to advertise our complete catalog of books on the earth sciences, which appeared in the Earth Science Digest from June 1949 to January 1950, we have found the following ten books to be the ones most in demand by our readers from the list of over 250 titles:

1. THIS EARTH OF OURS by C. W. Wolfe. 1950. 384 pp., illus. $5.00
2. HANDBOOK OF URANIUM MINERALS by Jack DeMent and H. C. Dake. 2nd Edition. 1948. 96 pp., 22 illus. 2.00
3. MANUAL OF MINERALOGY by Edward S. Dana. 15th Edition revised by C. S. Hurlbut, Jr. 1941. 480 pp., 436 illus. 4.50
4. GETTING ACQUAINTED WITH MINERALS by George L. English. 1936. 324 pp., 258 illus. 2.75
5. TEXTBOOK OF MINERALOGY by Edward S. Dana. 4th Edition revised by William E. Ford. 1932. 851 pp., 1089 illus. 6.00
6. HISTORICAL GEOLOGY by Carl O. Dunbar. 1949. 567 pp., 380 illus. 5.00
7. OPTICAL CRYSTALLOGRAPHY by Ernest E. Wahlstrom. 1943. 260 pp., 208 illus. 3.25
8. DANA'S SYSTEM OF MINERALOGY. 7th Edition by Charles Palache, Harry Berman, and Clifford Frondel. Vol. I: Elements, Sulfides, Sulfosalts, Oxides. 1944. 834 pp., 1500 illus. 10.00
9. INDEX FOSSILS OF NORTH AMERICA by Hervey W. Shimer and Robert R. Shrock. 1944. 837 pp., 303 pls. 20.00
10. THE OCEAN by F. D. Ommaney. 1949. 238 pp., 16 illus. 2.00

Is there a book relating to the earth sciences which you need and which was not listed in our catalog? If so, why not write to us? We can obtain for you practically any "in-print" book published.

The Book Shelf

The Earth Science Publishing Company Revere, Mass.

THE EARTH SCIENCE INSTITUTE

BULLETIN

Vol. 2 — No. 1 February, 1950

THE EARTH SCIENCE INSTITUTE BULLETIN is published occasionally by the Earth Science Institute for its members. All communications should be addressed to Jerome M. Eisenberg, Executive Secretary, The Earth Science Institute, Revere, Massachusetts.

SECOND ANNUAL MEETING
March 17, 1950

The second annual meeting of the Institute will be held at Boston University, Room 4, 725 Commonwealth Avenue, on Friday, March 17, 1950.

The Nominating Committee, Dr. C. S. Hurlbut, Jr., Mr. Maurice Gould, Mr. Gene Herrick, and Mr. Robert Lund, has recommended that the entire slate of officers elected for the past year be renominated. This slate shall be voted on at the annual meeting. Voting may be by mailed ballot or by ballot at the annual meeting.

Nomination of Officers for 1950-51

President: C. W. Wolfe, Boston University, Boston, Mass.

1st Vice-President: Gilbert O. Raasch, Illinois State Geological Survey, Urbana, Ill.

2nd Vice-Pres.: H. P. Zuidema, University of Michigan, Ann Arbor, Michigan.

Executive Secretary: Jerome M. Eisenberg, Revere, Mass.

Treasurer: Mary A. Mrose, Harvard University, Cambridge, Mass.

Councilor: H. R. Aldrich, Geological Society of America,, New York, N. Y.

Councilor: C. S. Hurlbut, Jr., Harvard University, Cambridge, Mass.

THE INSTITUTE LIBRARY

The following books have been loaned to the Institute by the Executive Secretary. 123 books were listed in the August and October 1949 Institute Bulletins.

Bravais. M. A. — ON THE SYSTEM FORMED BY POINTS REGULARLY DISTRIBUTED ON A PLANE OR IN SPACE. Translated by Amos J. Shaler (1949).

Jepsen, G. L., Mayr, E., and Simpson, G. G., edited by — GENETICS, PALEONTOLOGY, AND EVOLUTION (1949).

Cleland, H. F. — GEOLOGY, PHYSICAL AND HISTORICAL (1916).

Brooks, C. E. P. — CLIMATE THROUGH THE AGES (2nd Ed., 1949).

Goodrich, S. G. — THE WONDERS OF GEOLOGY (1855).

Jones, W. R., and Williams, D. — MINERALS AND MINERAL DEPOSITS (1949).

Lakes, A. — PROSPECTING FOR GOLD AND SILVER IN NORTH AMERICA (1899).

Leet, L. Don — EARTH WAVES (1950).

Lokeck, A. K.—GEOMORPHOLOGY, AN INTRODUCTION TO THE STUDY OF LANDSCAPES (1939).

Platt, W. — A POPULAR GEOLOGY (1924).

Reclus, E. — THE HISTORY OF A MOUNTAIN (1881).

Tillman, S. E. — A TEXT-BOOK OF IMPORTANT MINERALS AND ROCKS (1906).

von Engeln, O. D. — GEOMORPHOLOGY, SYSTEMATIC AND REGIONAL (1948).

Weaver, C. E. — GEOLOGY OF THE COAST RANGES IMMEDIATELY NORTH OF THE SAN FRANCISCO BAY REGION, CALIFORNIA (1949).

In addition to the twenty periodicals listed in the October 1949 Institute Bulletin, the following periodicals are also available to members of the Institute:

DER JUWELIER, Heft 11/12 (November-December 1949), to date. Bi-monthly.

FRONTIERS, Vol. 11, No. 2 (December 1946), to date. 5 times a year.

MONSANTO MAGAZINE, Vol. 28, No. 5 (December 1949), to date. Monthly.

TECHNICA, Vol. 3, No. 35 (November 1949), to date. Monthly.

THE LAMP, Vol. 31, No. 1 (January 1949), to date, 5 times a year.

THE NATIONAL SPELEOLOGICAL SOCIETY NEWS, Vol. 7, No. 5 (May 1949), to date. Monthly.

TRANSACTIONS AND PROCEEDINGS OF THE GEOLOGICAL SOCIETY OF SO. AFRICA, Vol. L (January-December 1947), to date. Annually.

Conference on the Teaching of the Earth Sciences in the Secondary Schools

March 17-18, 1950

The Conference on the Teaching of the Earth Sciences in the Secondary Schools, sponsored by the Earth Science Institute, will be held at Boston University on March 17-18, 1950. Dr. C. W. Wolfe of Boston University is Chairman of the Conference.

PURPOSE: The earth sciences should occupy a far more important place in the curricula of junior and senior high schools than they do at the present time. Since the earth sciences embrace much of chemistry, biology, and physics, and since a natural laboratory is available and free in the out-of-doors, it provides an adequate, low cost, and culturally advantageous approach to science which should commend itself to many school departments. The goal of the Conference is the extension of earth science education on an ever increasing scale into the secondary school system, where it has but little recognition today.

REGISTRATION: Registration will be held in Room 4, Boston University College of Liberal Arts, 725 Commonwealth Ave., Boston, on Friday, March 17, 11:00 A.M. - 1:00 P.M. There will be a registration fee of $1. Registrants will receive all of the Conference reports, which will be published shortly after the Conference. Registration is open to all persons interested in the program of the Conference.

PROGRAM: The following is the program of the Conference: (All papers will be read in Room 12, Boston University College of Liberal Arts, 725 Commonwealth Avenue. Exhibits, both commercial and non-commercial, will be displayed in Rooms 1 and 4). Approximately half of the time allotted to each speaker will be used for discussion.

FRIDAY, MARCH 17

Introduction to Conference

1:00- 1:15 P. M.	DR. C. W. WOLFE Boston University.	Welcome to Registrants and Statement of Purpose.
1:15- 1:45	—	Statistics on Earth Science Education.

Informal Earth Science Education

1:45- 2:30	DR. GILBERT O. RAASCH Illinois State Geological Survey.	Earth History Field Trips in the Secondary Schools.
2:30- 3:00	—	Forum on New England Earth Science Field Trips.
3:00- 3:30	MR. ARTHUR MONTGOMERY Harvard University.	An Experiment in Geologic Education in Newton Elementary Schools.
3:30- 3:50	MISS NANCY WATERMAN Children's Museum Jamaica Plain, Mass.	Earth Science Education in the Children's Museum, Jamaica Plain, Mass.
3:50- 4:10	MRS. FLORENCE LOVEJOY The Audubon Society.	The Audubon Earth Science Program.
4:10- 4:30	DR. C. S. HURLBUT, JR. Harvard University.	The Place of the College and Large Museum in Earth Science Education.

Organizational Work in Earth Science Education

4:30- 4:50	DR. DAVID M. DELO American Geological Institute	Earth Science Education and the American Geological Institute.
4:50- 5:10	DR. C. W. WOLFE Boston University.	Secondary Earth Science Education through the Earth Science Institute.
5:10-5:30	MR. ROBERT H. CARLETON National Science Teachers Association	The National Science Teachers Association and Earth Science Education.

6:00- 8:00 CONFERENCE SUPPER, Boston Commons, Boston University. Informal Addresses. (Reservations for the supper, which will not exceed $1.50, should be received by March 15 by the Chairman of the Conference).

8:30-10:00 ANNUAL MEETING OF THE EARTH SCIENCE INSTITUTE

SATURDAY, MARCH 18

Mechanics of Earth Science Education

9:00- 9:40 A. M.	MR. DONALD B. STONE Mont Pleasant High School, Schenectady, N. Y.	Curriculum of Earth Science Courses in New York State.
9:40-10:20	MR. GEORGE WILSON Quincy High School, Quincy, Mass.	Earth Science Education in Quincy, Mass.

10:20-11:00 MR. JOHN S. BARSS, Phillips Academy, Andover, Mass. — The Approach to Earth Science Education at Phillips Academy, Andover, Mass.

11:00-11:30 MR. JEROME M. EISENBERG, Earth Science Digest, Revere, Mass. — Earth Science Publications for the Secondary Schools.

11:30-12:00 MR. H. P. ZUIDEMA, University of Michigan — Visual Aids for the Earth Sciences.

12:15- 1:15 INFORMAL LUNCHEON, Boston Commons, Boston University.

Preparation of Teachers

1:30- 2:30 DR. CHESTER R. LONGWELL, Yale University — Preparation of Teachers for Courses in Earth Science Education.

2:30- 5:00 FIELD TRIP TO SQUANTUM, MASS. Dr. C. W. Wolfe, Leader. (Registration for the field trip will close at 10:00 A.M. Saturday. There will be a charge of 50¢ for those wishing to go by chartered bus from Boston University.)

BACK ISSUES OF

THE EARTH SCIENCE DIGEST

The following back issues of the Earth Science Digest are now available:

Vol.	No.	Date	PRINCIPAL ARTICLES	Price
1	3	Oct. 1946	Minerals of Missouri	$ .30
1	4	Nov. 1946	Craters of the Moon. An Alaskan Gold Deposit	.50
1	6	Jan. 1947	An Ore Deposit of Natural Steam. Alaskan Gold Trails of Ninety-Eight	.30
1	7	Feb. 1947	Michigan Minerals. A Missouri Ebb and Flow Spring	.30
1	9	Apr. 1947	Famous Lost Mines: The "Lost Dutchman". Ground Water. Fossil Fish	.30
1	10	May 1947	Metamorphism. Famous Lost Mines. The Lost Pegleg Smith. For Palace and Home (Gypsum)	.30
1	11	June 1947	Asbestos—The Miracle Mineral. Famous Lost Mines: Lost Portal Gold. Notes on the Stratigraphy of the Carboniferous of Scotland	.30
1	12	July 1947	How to Prospect for Radioactive Minerals with a Geiger Counter. Versatile Ooze. Physical Properties and the Lapidary. Famous Lost Mines: The Lost Dutch Oven Mine	.30
2	1	Aug. 1947	A Marsupial "Tiger" is Found in Nebraska. A Study of Lake Superior Agate (Part 1). Famous Lost Mines: The Lost Arch Diggings	.30
2	2	Sept.-Oct. 1947	Our Atmosphere. A Study of Lake Superior Agate (Part 2). Famous Lost Mines: The Lost Breyfogle	1.00
2	3	Nov. 1947	Zeolites Merit More Attention by Lapidaries. The Story of the Rock Cycle. Famous Lost Mines: The Lost Tub Placer	.30
2	4	Dec. 1947	What Happened to the Dinosaurs? Iron From Under the Sea. Earth Science in the Secondary Schools. The Miracle of "Moly". Famous Lost Mines: The Lost Papuan Diggings	.30
2	6	March 1948	Now They are Gone (La Brea Tar Pits). Minerals —Literally "Out of This World"	.35
2	7	Apr. 1948	The Father of Canadian Geology (Part 1). The Origin and Accumulation of Petroleum	.25
2	8	May 1948	Fire Clay. The Barite Group Minerals. The Father of Canadian Geology (Part 2). Notes on the Stratigraphy and Paleontology of the Carboniferous of Belgium	.25
2	9	June 1948	Colorado Mineral Localities. The American Federation and Earth Science Expansion. The Past and Future at Nantasket Beach	.25
2	10	July 1948	Digging for Dinosaurs. Denver Convention a Huge Success. Be Kind to Your Mineral Specimens	.25
3	1	Aug. 1948	The Touring Public Discovers Mato Tipi. Precious Gems from Cheaper Forms of Carbon Baffle Science. A History of Fossil Collecting (Part 1)	.25
3	2	Sept. 1948	Exploring the "Mysterious" (Caves) (Part 1). He Chases Thunderbolts. The Dwarfing of Invertebrate Fossils. New Light on "Darkest Africa". A History of Fossil Collecting (Part 2)	.25

BACK ISSUES OF THE EARTH SCIENCE DIGEST (Cont.)

Vol.	No.	Date	PRINCIPAL ARTICLES	Price
3	3	Oct. 1948	Exploring the "Mysterious" (Part 2). The Water Witches Are Still With Us. Stone Mountain, Georgia. A History of Fossil Collecting (Part 3)	$ .25
3	4	Nov. 1948	Coal Age Flora of Northern Illinois. Grass-roots of the Geological Sciences. Volcanic Eruptions in Hawaii	.25
3	5	Dec. 1948	The Gros Ventre Landslide (Part 1). Cloudland Canyon State Park and Lookout Mountain, Georgia	.25
3	6	Jan. 1949	The Gros Ventre Landslide (Part 2). The Wild Well at Leduc. Earthquakes Can't be Forecast but New Map Shows Possibility. Gems From the Sky	.25
3	7	February 1949	The Moonscar Upon the Earth (Part 1). Staurolite and its Occurrence in Georgia. The Bryce Canyon National Park	.25
3	8	March 1949	The Moonscar Upon the Earth (Part 2). The Geological Survey	.25
3	9	Apr. 1949	Surface Geology at the Border of an Ice Sheet Continental Shelf Petroleum Deposits Investigated. Field Geology at Camp Branson	.25
3	10	May 1949	Coal Geology: An Opportunity for Research and Study. Atomic Energy in Relation to Geology	.25
3	11	June 1949	The Search for Uranium (Part 1). Oil from Coal—A New Industry. Petroliferous Geodes: Their Occurrence and Origin	.25
3	12	July 1949	Scenic Kansas. The Search for Uranium (Part 2). Index for Volume III	.25
4	1	Aug. 1949	Soil Erosion in Southern Russia. The Search for Uranium (Part 3). U.S.A.E.C. Domestic Uranium Program. The Earth Science Institute Bulletin (Vol. 1, No. 1)	.25
4	2	Sept. 1949	The Blister Hypothesis and Geological Problems. The Green River Oil Shales. Fossils in the Old Red Drift of Pierce Co., Wisc.	.25
4	3	Oct. 1949	Mount Mazama and Crater Lake. The Earth Science Institute Bulletin (Vol. 1, No. 2)	.25
4	4	Nov. 1949	Geophysical Exploration with the Airborne Magnetometer. Recent Research in Submarine Geology	.25
4	5	Dec. 1949	South-Central New Mexico's Sink-Holes and Craters. Frozen Ground Studies (Part 1). Research in Geophysics and Terrestrial Magnetism at the Carnegie Institution	.25
4	6	Jan. 1950	Investigation of the Prairie Creek Diamond Area, Pike County, Ark. U. S. Coast Guard Counts Icebergs from Air. Earth Science Papers Presented at the A.A.A.S. Meeting	.25

THE EARTH SCIENCE PUBLISHING COMPANY

Revere, Massachusetts

You are cordially invited to attend the eighth

EXHIBITION and SALE

OF

Fine Mineral Specimens

TO BE HELD IN THE

NEW ENGLAND ROOM OF THE
LEXINGTON HOTEL

LEXINGTON AVENUE at 48th STREET
NEW YORK CITY

FRIDAY, MARCH 17th, 1950
From 9:00 A.M. to 9.00 P.M.

and

SATURDAY, MARCH 18th, 1950
From 9:00 A.M. to 5:00 P.M.

Featuring

Choice mineral and crystal specimens including superb crystallized golds from a remarkable large collection.

Selected specimens from a Central European collection recently purchased.

Recent acquisitions of interest to collectors.

PLAN NOW TO ATTEND

SCHORTMANN'S MINERALS

10 McKINLEY AVENUE EASTHAMPTON, MASS.